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SIMULATING SCIENTIFIC WORK IN MICROCLIMATE: COLLABORATIVE LEARNING IN A BLOGOSPHERE

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Abstract. Pedagogical and technical details from a senior course in Computer Science are presented in the article as practices for web-based learning methods in higher education. The course working methods included frequent individual contributions but enhanced collaboration for the benefit of the whole learning community. Like this the course setting simulated work of a scientific community in microclimate. The course results show that the students actively both participated and used each others’ publications for own contribution. The used web-based environment support collaborative learning. The course format, use of a blogosphere for the format and continuing assessment to support learning can be recommended for other web-based courses as well.

Keywords: Assessment, blog, collaboration, collaborative learning, community, course, education, e-learning, web-based courses

1. INTRODUCTION

Computer-supported learning environments is a senior course in Computer Science at the University of Helsinki. The course has for several years now been provided with only web-based course activities. The used learning platforms have varied, but the pedagogical idea of having strong student participation with collaboration and open-ended assignments with participant-selected topics has been the common nominator for all these courses. Previous years the course has been working in self-produced environments EDUCO [3], EDUCOSM [7] and OurWeb [6], which provided tools for different aspects of collaboration and support for group work and whole learning community communication. Once, also BSCW [1] was used. All these course instances have had group assignments with weekly or student-selected deadlines. In spring 2008, the same whole-course collaboration goal was maintained but instead of group assignments, students would this time write individual submissions. Instead of large weekly or biweekly reports produced with preliminary versions through commented process writing, the student submissions would be small entries, so small that it would be possible to submit several of them per week, and still have time to read and comment on other students’ work. The idea here was to simulate scientific work [2] in microclimate; to read others’ publications and use them as ideas and sources for one’s own work. In this way, the course material would become a web of useful knowledge, built together as a community.

After testing the pedagogical idea in the course setting, where the results supported the expectations, the case was considered worth sharing as best practices in web-based education. In this article, the pedagogical ideas in the course setting are described, motivating the selection of used educational technology tools, also presented. The course results are provided with some pedagogical points. Finally, conclusions are presented with best practices learned from the course experience.

2. PEDAGOGICAL BACKGROUND

Aligned teaching [5] means that all choices made in the course practical details aim at fulfilling the learning goals. After defining the learning goals they are used to select assessment methods that respect goals fulfilling outcomes. Then, working methods that make the selected assessment methods possible are selected. In this way, all students’ work contributes to their learning, and they naturally focus on the issues teachers want to. Web-based collaborative environments provide possibilities for peer knowledge exchange through discussions and peer publishing. The discussions and shared knowledge in the web-based course community may even support the individual writing process by turning it into part of a larger, shared process [4]. The development of academic cognitive skills like critical thinking and argumentation strengthen student courage in publishing their own thoughts for others to see. To reach this kind of collaborative knowledge building, the course setting need to be provided with frequent and public student outcomes, enhancing active participation. In the described case, the focus is in students as producers; they should show in their writing how they have processed and structured the subject, what they respect in their peers’ work, what they have learned.

The more a student puts effort in working with course learning tasks, the better tend her course outcomes be. This holds also for web-based working methods [9], when looked at individual learning outcomes. In that case, the student’s effort, i.e. activity, as reading course material, promotes her own learning. But in collaborative learning, the student activities are wanted to promote the learning of the whole course community. At that point, activities like reading are not visible, meaning “of no value”, for the
community until the student publishes the result of the reading activity. Here, she promotes both her own learning, by processing the source material, and the community’s learning, by telling the “news” to all others.

If the course assessment methods emphasize individual learning outcomes, like with exams, students have no need to share their knowledge. But if the assessment respects contributions that are valuable for the whole community, the students start working for the community. In short, assessment methods direct student activity. In the described course setting only active participation is promoted and active participation means submitting for the community.

### 3. COURSE SETTING

The course scope for Computer-supported Learning Environments covers all possible ideas and applications that computer and web-based environments provide for studies and learning, from history to future. The learning goal is to create a general view on modern educational technologies, recent research topics and their near future practical applications in education [2], aiming at an increase in awareness and knowledge on the scope. Though this learning goal is common for all participants, final areas of new knowledge vary between students because of their previous knowledge, areas of interest and focus of their course publications.

Because of the scope, the actual course contents would evolve every year, causing potential teacher-produced material a clear and laborious, even desperate need for renewal every year. This, combined with the goals, is a natural motivation for selecting working methods where all course participants are peers working as a community in creating collaborative pool of knowledge. Assessment of student contributions focus on the added value the contributions bring to the course community, also in form of extra credits for most useful starting-point articles produced by course participants.

#### Assignment and schedule

The course included actually only one assignment: to learn to know the scope with the help of any published material on the web, in the scientific article databases, and in peer blog posts in the course blogosphere, and to produce weekly own blog posts so that at the end of the course they would be 24 of them. This assignment and some preliminary topics as a start were presented on the course instructions page [2]. The first post was instructed to be a presentation note with personal interests, background on the scope and specified learning goals. The last post was similarly instructed to be an evaluation of the learning process with highlights on most affected peer blogs or postings. Half-way, it was possible to write a milestone-post reflecting the activities so far.

In spring 2008, there were about nine calendar weeks between the course start and end dates. The total writing amount of 24 posts was split to eight weekly work loads of three blog posts. Each course week was allowed to start on any week day, ending on the same week day next calendar week. The students selected their individual weekly deadline days at the start of the course. The idea was that the posts would be published on the course area regularly, keeping the area active and alive, and thus encouraging the students to keep regular work habits. Every course week should also include reading peer postings.

#### Instructors

There were no actual “teachers” on the course in the sense that no-one would give lectures or provide material about the subject for the students. Instead, there were two instructors who were told to be peers as learners in the subject with the students. The instructors would actively follow and participate in the discussion with the students, preferably not instead of them.

When the students were asked to reflect and comment on each others’ posts in their own blogs, the instructors concentrated on giving feedback to the student posts with comments. Every post was not commented on; that would not have been possible, either, because of the time needed. But every student should have at least weekly comments. The comments could include discussion, questions or further hints on the subject, or suggestions for possible future directions. Sometimes, also direct links were given.

#### Course assessment and grading

Each student post was graded on a five step scale from 0 to 2 points (0, ½, 1, 1½, 2) by both two course instructors. The final points for the post were the average of both instructor grades, resulting on a 9-step scale with ¼ point distances. The course grade was counted based on the sum of at most 24 blog post points. At the beginning of the course, the students were encouraged that it was possible to get extra points at the end of the course based on both regular activity and peer evaluation. Blog posts that would be sources for interesting threads would gain extra bonus, and every course week the students were active writing and publishing own blog posts, they would get activity points.

Common assessment criteria for postings were given on the course instructions page [2]. The criteria included discussion on the contents – in the scope – and the structure of the essay. The grading scale sharpened during the first weeks of the course, based on the instructors’ experiences, to:

- **2p** Meaningful, well selected subject for the community, well defined and structured in presentation and length
- **1.5p** Meaningful subject showing enough contents and presentation, with some problems in structure or fluency. Including also some far too long but potential posts (which were instructed to split)
- **1p** Acceptable in subject and contents, showing some problems in length (far too long with poor structure or far too short), presentation, fluency, understanding of the subject
- **0.5p** Not enough in scope nor contents with weak understanding of the discussed matter
- **0p** Nothing to be graded; a general comment or own note

Both course instructors graded all posts individually, after occasional discussions on unclear cases. The grades would
also be public for all participants. Like all student work was visible to the whole community, also the assessment as the instructor part of the course work was designed to be visible throughout the course, as part of the openness in the learning processes and of the confidential course atmosphere. It was also assumed that the ongoing grades publishing combined with instructor feedback would guide students with lower graded blog posts to read better graded posts and take model from them in writing their next posts closer to the style and quality of the stronger students.

Both instructors assessed all blog posts, though it was double work. This was both because of the new working method and because the same had been done on previous courses too. The goals for this were to ensure objective assessment for all students, and to learn on the method and experience. After learning to be effective, the assessment process was straight-forward.

4. THE LEARNING ENVIRONMENT SUPPORTING ALL PEDAGOGICAL NEEDS: A CLOSED BLOGOSPHERE

The course working method needed a collection of tool functionalities. The learning environment was selected based on these needs: the environment should provide individual blogs for each user; it should be closed under login; linking between blogs in the blogosphere should be easy; the posts needed to be assessed in a simple way; and the environment should provide feeds and aggregates on feeds on both posts and comments. All this should be provided through a course main page.

By default, blogs provide a tool for public writing. This kind of openness was not considered meaningful in formal course work where all the student posts were assessed on a numerical scale with verbal feedback. Though it was assumed that most student blog posts would be at least of satisfactory quality, it was still correct towards the students to provide a closed environment. It was also assumed based on previous experience that students would behave and write more freely in a closed than in an open environment.

Since there would be hundreds of blog posts and probable simultaneous editing, each participant would need a blog of their own instead of one course blog. The instructors would also use their blogs like the students, for writing general comments and reflections. Another need for the course design was to provide easy linking between posts in the whole blogosphere. The idea was that students would read each others’ posts and reply to them in their own blogs by using the reply-button under the original message. Finally the built-in linking tool was used along with traditional html-hyperlinking when referring to peer blog posts.

Each blog post would be graded. Since there were assumed to be hundreds of grading items, the process needed to be very simple and fast for the instructors. The environment provided a separately for the course needs built tool to the instructors for the grading: each post was provided with a drop down menu which was visible for the instructors only. Besides the numerical grade, the instructors gave feedback on the submissions as a comment to the post. The verbal feedback was technically simple to give along with the numerical grade.

A grade summary page collected all graded blog posts sorted by student name in a list. The page included links to each blog post and provided the corresponding points, counted as average of the two instructor points. The page provided also the cumulated sum of each student’s blog post grades. As soon as a blog post was graded by both instructors, the post was automatically added to the summary page for all course participants to see.

Course participants needed a straight-forward method for following all course blog rolls. Feed aggregates on both posts and comments were provided on the course main page after login. The feeds were also provided from each participant blog separately, also of posts and comments, so it was possible to follow each writer by name if wanted. Since the environment required login, unread blog posts and comments could be highlighted for each user, providing a strong tool for both students and instructors in following the course activities. The course main page included, besides the post and comment feeds, common course instructions as wiki pages editable for both course instructors, and a link to the summary page on all blog posts.

5. RESULTS

18 students started the course with at least one blog post. 17 students presented themselves with a first blog post as instructed and 15 students wrote a final reflection as the last posting during the last course week. 12 students used also the possibility for a mid-course reflection post. Finally, 15 students passed the course after writing 13-25 blog posts.

There were altogether 915 messages in the blogosphere at the end of the course. 352 of the messages were blog posts, the rest being comments. The instructors wrote together 15 posts as further instructions and reflective notes. 336 student blog posts were evaluated, of which 44 were reflective posts and 292 with substantial topics.

Blog posts were published every day, except for one day at the end of the course. There was some weekly variance in daily activity according to the personal weekly deadlines. Some major events can still be pointed out; they are emphasized with circles in the activity graph in Fig. 1.
At mid-course, there happened to be the Finnish skiing holiday, not in higher education but in comprehensive and high schools. Some of the students had a break during that week and published “extra” some days earlier or later. Two weeks later was the common exam week at the faculty, causing retention in the posting activity. The final rush, when students with lacking numbers of postings took all sprint, can be seen as a high activity peak at the end days of the course.

The students followed actively the development of the blogosphere and wrote their replies in both comments and own blog postings. A majority of student blog posts gained further activity, meaning that they have activated thoughts and a need for written reactions as reply posts or received comments, like presented in Fig. 2a. Over half of the posts were even used as sources for later student posts, like shown in Fig. 2b.

In the final sprint students obviously minimized their working hours and left out part of the process — reading peer posts and using them. Though, many of the last posts were written simultaneously and published close to each other, which made their peer use impossible. Many of the last posts were also meant to be final remarks, without need for comments. Combined, figures 1-4 show the overall activity on the course being regular, frequent and collaborative knowledge building.

Though the students were instructed to mainly reply to each others’ postings in their own blogs, discussion was lively also in comments; only under half of the comments were written by the instructors, as shown in Fig. 5. The overall number of comments was over 500. Still, there were posts without comments, not even from the instructors. A tool for visualising which posts had and had not received comments would have been useful for the instructors.

The overall learning outcomes developed during the course from split, heterogeneous results to more homogeneous work, but the grades of the blog posts varied throughout the course. The overall picture of all grades is in Fig. 6.

To get a view on the development of the learning outcomes, the outcomes were grouped into five phases during the course. An overall graph on the development of outcomes is presented in Fig. 7 with both average and median. Also the most typical value, i.e. the mode, is included.

At the beginning of the course, the introduction phase showed interesting presentation messages, while the focus, quality and so the grades were heterogeneous in the first substantial posts. Both the students and the instructors were seeking for the nominators for excellent postings. There were many excellent posts, but the negative difference between the median and average tells about a number of low graded posts. When the students had found “their way” of working and interesting subjects to report on, also the grades developed. Still, there were some low graded posts
lowering the average. The mid-course holiday week was a decline in number but also in the quality of postings. The best phase was during the second half of the course, when the students had lots of previous peer postings as both sources and models for what is wanted. At that point, the weakest postings had developed closer to the most interesting ones, i.e. the average has reached the median in the graph.

The final sprint in writing affected the quality of posts during the two last course weeks. The overall quality was stabilized but to a lower level than at the best. Some of the students clearly optimized premium quality for number of posts to pass the course. One more aspect in the discussion of the quality development is the light grading scale which probably reduced differences between different levels of quality. Altogether, the learning outcomes were of good quality; ¾ of all contributions were assessed as “meaningful subjects for the community” with at least 1,5 points and the average of all posts was 1,59 points. 96% of the blog posts were at least of acceptable quality and usefulness for the community, and only 4% not. The overall distribution of grades is presented in Fig. 8.

The students were encouraged to reflect on their learning in the reflective posts. The 44 reflective posts got in average better points (presentations 2, mid-term reflection 1,81 and final reflection 1,85) than the overall average.

In the course feedback, the students regarded the course as easier than average, though the work load was quite high. One explanation for this could be that the students were allowed to select the topics as easy or challenging as they wanted. The post grades raised discussion during the course and got one item in the feedback also. The grading criteria was partly considered too light. When looking at grading tables and course results compared to the instructors’ vision of the most contributed students, the course grades were distributed coherently. The final course grades on the 1-5 were:

- 5: ******
- 4: **
- 3: **
- 2: ***
- 1: **

6. CONCLUSIONS WITH BEST PRACTICES

Collaborative learning makes it well in a web-based environment supporting the activity. A blogosphere serves very well as a tool for the presented kind of collaborative course setting. The teachers on each course must of course consider their own pedagogical goals when designing their courses; for this case, the preferences are presented in this article. The recommendable practices considered after the course are: the course format, use of blogosphere as tool for the described course format, and the easy and public assessment system.

The course setting with many small submissions within the course week system produced daily activity in the course environment. The students were able to work in their individual paces inside the together agreed-on schedule, which also ensured regular submissions. The selected tool provided an easy-to-use interface for the overall picture with latest topics. There were always interesting blog posts to read whenever you logged in.

Though the presented course case is from Computer Science, the format can be recommended to other fields of science as well. The format is clear but tough for students; if the students are not used to this kind of working-by-writing, the first course takes probably some extra time. The individual and interesting learning outcomes were appreciated by the students in the final reflections and course feedback.

From the instructor point of view, grading was fast, intuitive and easy. One minor detail would have been a tool for summarizing the non-graded posts in one place. The grading scale was short, only 0-2 points, which made the grading simple. If there needs to be clear differences between different qualities of submissions, the scale must be reconsidered. But it is to note that a heavier scale increases also grading criteria, which in turn increases the time needed for assessment per student. Instructor resources are an aspect to consider when selecting working methods – though focus is expected to be in the desired learning results. Also with the used 0-2 point scale the meaningful knowledge was emphasized, there were differences between
students and the whole course grade scale was finally in use.

The separate grading functionality built in the system was excellent. It is a script, usable probably with other blog engines, as well. From the student point of view, the open grading was appreciated. The students followed each others’ blogs and grades through the summary page and waited for the latest grades to come. They appreciated also the idea of cumulating course points throughout the course duration.

7. REFERENCES


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